R E P O R T R E S U M E S

ED 018 267 PS 000 489

THE COGNITIVE ENVIRONMENTS OF URBAN PRE-SCHOOL CHILDREN. MANUAL OF INSTRUCTIONS FOR ADMINISTERING AND SCORING "ETCH-A-SKETCH" TASK.

BY- HESS, ROBERT D. AND OTHERS
CHICAGO UNIV., ILL., URBAN CHILD CENTER

PUB DATE 67

EDRS PRICE MF-$0.25 HC-$0.72 16P.

DESCRIPTORS- *PRESCHOOL CHILDREN, *NEGRO MOTHERS, SOCIOECONOMIC BACKGROUND, URBAN ENVIRONMENT, TASK ANALYSIS, *PARENT CHILD RELATIONSHIP, TEACHING SKILLS, PSYCHOMOTOR SKILLS, *INTERACTION PROCESS ANALYSIS, MEASUREMENT INSTRUMENTS, *MEASUREMENT TECHNIQUES, TESTING PROGRAMS, CHICAGO, ETCH-A-SKETCH,

THIS MANUAL DESCRIBES MEASURES USED IN "THE COGNITIVE ENVIRONMENTS OF URBAN PRE-SCHOOL CHILDREN" PROJECT AT THE UNIVERSITY OF CHICAGO. THE SAMPLE FOR THE STUDY CONSISTED OF 163 NEGRO MOTHER-CHILD PAIRS SELECTED FROM 3 SOCIOECONOMIC CLASSES BASED ON THE FATHER'S OCCUPATION AND THE PARENTS' EDUCATION. A FOURTH GROUP INCLUDED FATHER-ABSENT FAMILIES. THE MOTHERS WERE INTERVIEWED AT HOME AND THE MOTHERS AND CHILDREN WERE TESTED AT THE UNIVERSITY OF CHICAGO WHEN THE CHILDREN WERE 4 YEARS OLD. FOLLOW-UP DATA WERE OBTAINED WHEN THE CHILDREN WERE 6 AND AGAIN WHEN THEY WERE 7. THE "ETCH-A-SKETCH" TASK WAS THE LAST OF 3 MOTHER-CHILD INTERACTION TASKS GIVEN DURING THE SECOND UNIVERSITY TESTING SESSION. THE OTHER 2 ARE DESCRIBED IN MANUALS PS 000 486 AND PS 000 487. THE "ETCH-A-SKETCH" TOY USED HAS 2 KNOBS WHICH CONTROL THE VERTICAL AND HORIZONTAL MOTIONS OF AN ERASABLE LINE TRACE. THE MOTHER WAS SHOWN HOW TO USE THE TOY FIRST AND WAS ALLOWED TO BECOME FAMILIAR WITH IT. SHE WAS THEN GIVEN AN OPPORTUNITY TO SHOW IT TO HER CHILD. THE TESTER THEN ASKED THEM TO COPY 5 FIGURES OF INCREASING COMPLEXITY DRAWN ON CARDS, WITH THE MOTHER WORKING ONE KNOB AND THE CHILD THE OTHER. THE FIGURES PRODUCED WERE TRACED BY THE TESTER FOR SCORING. FOUR PERFORMANCE MEASURES, BASED ON THE DRAWN FIGURE AND THE TIME TAKEN TO COMPLETE IT, WERE OBTAINED. IN ADDITION, THE MOTHER WAS SCORED ON 3 TEACHING MEASURES BASED ON (1) PRACTICE PERIOD BEHAVIOR, (2) SPECIFICITY OF DIRECTIONS, AND (3) USE OF THE CARDS AS MODELS. THE COMPLETE SET OF PROJECT MANUALS COMPRISES PS 000 475 THROUGH PS 000 492. (DR)

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

THE COGNITIVE ENVIRONMENTS OF URBAN PRE-SCHOOL CHILDREN

Robert D. Hess, Principal Investigator

16

MANUAL OF INSTRUCTIONS

FOR ADMINISTERING AND SCORING

"ETCH-A-SKETCH" TASK

The measures described in this manual were developed in the project, Cognitive Environments of Urban Pre-School Children, supported by: Research Grant #R-34 from the Children's Bureau, Social Security Administration, and the Early Education Research Center, National Laboratory in Early Education, Office of Education, both of the U.S. Department of Health, Education, and Welfare; the Division of Research, Project Head Start, U.S. Office of Economic Opportunity; the Ford Foundation Fund for the Advancement of Learning; and grants-in-aid from the Social Science Research Committee of the Division of Social Sciences, University of Chicago.

PS 000489

THE COGNITIVE ENVIRONMENTS OF URBAN PRE-SCHOOL CHILDREN

The research sample for the Cognitive Environment Study was composed of 163 pairs of Negro mothers and their four-year-old children, from three socioeconomic classes, defined by father's occupation and parents' education: upper-middle, professional and executive, with college education; upper-lower, skilled and blue collar, with high school education; lower-lower, semiskilled and unskilled, with no greater than tenth-grade education; a fourth group included father-absent families living on public assistance, otherwise identical to the lower-lower class group.

Subjects were interviewed in the home, and mothers and children were brought to the University of Chicago campus for testing, when the children were four years old. Follow-up data were obtained from both mother and child when the child was six years of age, and again at seven years.

Principal Investigator for the project is Professor Robert D. Hess, formerly Director, Urban Child Center, University of Chicago, now Lee Jacks Professor of Child Education, School of Education, Stanford University.

Co-Investigator for the follow-up study is Dr. Virginia C. Shipman, Research Associate (Associate Professor) and Lecturer, Committee on Human Development, and Director, Project Head Start Evaluation and Research Center, University of Chicago, who served as Project Director for the pre-school phase of the research.

Dr. Jere Edward Brophy, Research Associate (Assistant Professor), Committee on Human Development, University of Chicago, was Project Director for the follow-up study and participated as a member of the research staff of the pre-school study.

Dr. Roberta Meyer Bear, Research Associate (Assistant Professor), Committee on Human Development, University of Chicago, participated as a member of the research staff during the pre-school and follow-up phases of the project and was in charge of the manuscript preparation during the write-up phase of the research.

Other staff members who contributed substantively to the project include Dr. Ellis Olim (University of Massachusetts, Amherst), who was responsible for the major analysis of maternal language; Dr. David Jackson (Toronto, Ontario), who was involved in early stages of development of categories for the analysis of mother-child interaction, and participated in the processing and analysis of data; Mrs. Dorothy Runner, who supervised the training and work of the home interviewers, acted as a liason with public agencies, and had primary responsibility for obtaining the sample of subjects; and Mrs. Susan Beal, computer programmer.

COGNITIVE ENVIRONMENT STUDY

"ETCH-A-SKETCH" TASK MANUAL

SUMMER 1967

INTRODUCTION

The "Etch-A-Sketch" task was the last of the three mother-child interaction situations to be completed during the subjects' second visit to the university, and was the final research measure to be administered. It was reserved for the end because it required the mothers to exercise continued tight control over their children for periods as long as one hour, so that in many cases subsequent activities would have been seriously affected by fatigue factors. The task was designed to emphasize the affective and control aspects of mother-child interaction, complementing the cognitive sorting tasks which placed a premium on information transmission.

MATERIALS

This task makes use of the "Etch-A-Sketch," a toy sold commercially by the Ohio Art Company, Bryan, Ohio. Two "Etch-A-Sketch" toys are required for the task if the subjects' productions are to be traced. Also needed are 5" by 7" pieces of very thin tracing paper (equal to the size of the "Etch-A-Sketch" screen) and a short (less than 5" long) straight-edge or ruler. With this equipment the subjects' productions may be traced and preserved for later scoring.

The models to be copied were drawn in black ink on white 3 3/4" x 5" cards. Below each model was written the maximum number of points allowed for a perfect copy of the design, an amount which equaled the number of lines in the design; these were used later when the mothers were asked to predict the number of points they could earn. The designs used in our task are shown at the end of this manual.

PS 000489

Since only vertical and horizontal lines were used, each succeeding design differs from previous ones only in the length and number of lines and is therefore quantitatively but not qualitatively more difficult. The knobs never had to be used simultaneously or turned in both directions to make a specific line. All that was required to make a perfect line was to begin in the proper direction and to stop when the proper length was reached.

PROCEDURE

The mother was first familiarized with the toy while the child was not present. She was allowed to manipulate it freely and note its possibilities and properties on her own. The tester then asked her to construct a square, which the mother continued doing until she could do it easily without help.

The task proper began later when the child was present. The child was seated to the right of the mother, since he was to use the knob on the right (vertical lines). The tester sat across from the mother. After briefly outlining the task the tester left the table and busied herself elsewhere for 3 minutes while the subjects practiced. When the tester returned she presented the first model to be copied. The exact instructions were as follows:

(Have mother make a square on the board before task begins. She should have reached that level of performance before she teaches the child in the interaction situation.)

Interaction (place board in front of mother and child on the table)

THIS IS AN ETCH-A-SKETCH. YOU CAN MAKE DIFFERENT SHAPES BY TURNING THE KNOBS. (Tester makes a square.) IN A FEW MINUTES, I WILL GIVE YOU 5 DRAWINGS TO COPY ON THIS BOARD, WORKING TOGETHER. MRS. _____, YOU ARE TO WORK THE LEFT KNOB, AND _____, YOU WORK THE RIGHT KNOB. (Tester points to the knobs as she talks.) YOU MAY NOT TURN EACH OTHER'S KNOBS, BUT MRS._____, YOU MAY GIVE ANY DIRECTIONS YOU WANT TO. I'M NOT QUITE READY TO BEGIN, SO YOU HAVE A FEW MINUTES TO PRACTICE USING THE BOARD.

(3 minute practice period)

WE'RE ABOUT READY TO BEGIN. (Take board away. Present first model in front of mother and child.) HERE IS THE FIRST DRAWING I'D LIKE YOU TO COPY. TRY TO MAKE IT THE SAME SIZE, THE SAME SHAPE, EVERYTHING JUST THE SAME. AFTER YOU HAVE FINISHED, I WILL COPY IT ON A SHEET OF PAPER SO LATER I CAN SEE JUST HOW CLOSE IT COMES TO THIS DRAWING.

IF YOU MAKE IT JUST THE SAME AS THIS DRAWING, YOU GET 4 POINTS. IF IT IS NOT JUST THE SAME, YOU WILL GET FEWER POINTS. HOW MANY POINTS, FROM ZERO TO FOUR, DO YOU THINK YOU AND _____ CAN GET ON THIS FIRST DRAWING, WORKING TOGETHER?

YOU CAN REPEAT EACH DRAWING AS MANY TIMES AS YOU LIKE. AFTER EACH ATTEMPT, I WILL ASK YOU TO DECIDE WHETHER YOU WANT TO TRY IT AGAIN, OR WHETHER YOU WANT TO GO ON TO THE NEXT DRAWING.

FROM NOW ON, PLEASE DON'T SHAKE OUT THE BOARD, BECAUSE I MUST COPY EACH DRAWING YOU MAKE.

I'LL MAKE SURE THE LINE STARTS ABOUT HERE (point) SO YOU WON'T HAVE TO WORRY ABOUT THAT (start line slightly above center of board).

(Leave card with figure on it on table facing mother; do not present fresh board until decision is reached.)

Question: HAVE YOU DECIDED?
ARE YOU GOING TO TRY IT AGAIN, OR DO YOU WANT TO GO ON TO THE NEXT DRAWING?

(Use above question when necessary; i.e., when mother does not spontaneously give decision.)

The tester traced each production (as precisely as possible) while the subjects began a new attempt, at the same or the next design, using the alternate "Etch-A-Sketch". Each time a <u>new</u> design was attempted (not a repeat of the design) the tester ascertained a prediction from the mother. The task ended when the last production (last attempt at Figure <u>V</u> was accepted by the mother.

<u>SCORING THE FIGURES</u>

The "Etch-A-Sketch" productions are scored by comparing the traced figures to the standard models. Anyone tracing figures must be extremely careful to

make sure that the subjects' productions are traced exactly. Since points are deducted for "tails" extending from corners and for failure to close the figures, tracers should be familiar with the scoring system so that they do not inadvertantly lower scores by creating "tails" when tracing. The scoring system to be described below appears complicated at first, but in practice it is easily and reliably applied. By superimposing the tracings over 1/8 inch graph paper, the scorer can make the necessary determinations without requiring a ruler or other measurement devices (see attached graph paper with standard models). The scoring system used is as follows:

A. COMPLETE FIGURES

1. Determine a base line length. The base line length, plus or minus 1/16" is that length to which most of the lines of the figure correspond. It is the modal length. For example, if 8 of the 12 lines on the cross are between 15/16" and 17/16", the base length is one inch — the same as that for the model.

2. Count correct lines. Correct lines are those which are within 1/16" of the base length and which have no tails.

3. Adjust for base length. If the base length is the same as that for the model, deduct nothing. Otherwise, deduct 1 point for every 1/16" that the base length differs from the base length of the model.

4. Adjust for double tails. Deduct 1 additional point for every line on the figure which has two tails — one at each end.

EXAMPLE

Figure A (cross)		Figure B (cross)
1"	Base length	17/16"
8	# Correct Lines (proper length, no tails)	8
0	# Double Tails	2
-	Adjmt. for Base Length	-1
-	Adjmt. for Double Tails	-2
8	SCORE	8-1-2 = 5

B. INCOMPLETE FIGURES

Occasionally subjects will accept a figure which is not closed (i.e., does not form a geometric polygon). These figures are scored in exactly the same way as complete figures, except that the scores may not exceed the following maximum values:

Figure	MAXIMUM SCORE
1.	0 + the number of attempts made
2.	1 + the number of attempts made
3.	2 + the number of attempts made
4.	3 + the number of attempts made
5.	5 + the number of attempts made

In practice it has been found that incomplete figures usually do not earn scores near the maximum. They are usually so poor that no credit can be given at all. The bonus for effort was used only twice in scoring 60 figures. Its main function is to discriminate a little more finely at the lower end of the distribution.

C. SPECIAL PROBLEMS AND CONVENTIONS

1. Any figure not attempted at all is automatically scored zero.

2. If one of the first 3 figures is so large that the adjustment for base length would produce a zero score, but still the figure is symmetrical and has no tails, credit is given. Score 1 point for the square, 2 for the L, and 3 for the T. If the figure is asymmetrical or has tails, score zero.

3. If a figure is essentially complete except for a failure of closure in one spot:

   a. Ignore if the hole is less than 1/16".
   b. Deduct 1 point if it is more than 1/16".
   c. Deduct for a double tail if a line contains both a hole and a tail.

4. Occasionally two base lengths can be used for a given figure. Usually they yield the same score. If not, award the higher score of the two.

5. The L and the T present special problems because the lines are not of equal lengths. Special scoring models with larger base lengths are provided to facilitate scoring. Often it is necessary to score by subtraction rather than addition, deducting from the maximum score 1 point for each tail and 1 point for each 1/16" asymmetry (as when one side of the T is longer than the other).

If both methods are used, award the higher score.

6. Results show that scores tend to be low (averaging 25% of the possible total). Consequently it is recommended that credit be given in borderline situations (as when a line is exactly 1/16" too long). Whenever it cannot be unequivocally decided whether or not a line is correct, score it as correct.

PERFORMANCE MEASURES

A. SCORE

Total scores are obtained by summing the scores from the 5 designs (see Scoring Manual). The score used is the Best Possible Score obtained by summing the scores from the best attempt (highest score) at each design. Range = 0 - 50 points.

B. TOTAL PREDICTION = Sum of mother's predicted points for the 5 designs.

C. DISCREPANCY SCORE = Prediction total - Score total + 50.

The addition of 50 points converts all scores to positive numbers. If discrepancy scores are to be correlated with other variables, the prediction and score distributions should first be normalized before discrepancy scores are obtained.

D. TOTAL TIME (to nearest minute).

This seems to be the best measure of effort, since the total number of attempts is affected by the subjects' speed in making lines and by differences in how far the mothers will go with an imperfect figure before requesting a new board.

TEACHING MEASURES

A. PRACTICE PERIOD BEHAVIOR

The following categories of behavior were used in coding the subjects for their use of the practice period:

1. Practice - No Practice. "No Practice" means that neither the mother nor the child attempted to use the board, and that the mother accepts or condones this. She does not try to practice or to get the child to do so. They essentially ignore the board.

2. Child Practices - Child Does Not Practice. The purpose here is to determine those cases where the mother alone uses the board. She either plays with it herself or demonstrates it to the child, but she does not allow the child to use it himself. Another situation that is relevant here is the case where the child ignores or resists the mother completely so that he never actually practices (follows a direction). Here the mother lacks sufficient control over the child to be able to institute a practice session.

3. Mother Structures - Child Structures. The basic question here is: Does the mother express commands or expectations to the child regarding what she expects him to do? The child is structuring when:

a. He plays alone with the board, with mother's tacit approval.

b. He begins giving directions to the mother, and the mother follows them without giving any of her own.

The following situations are scored as cases where the mother structures:

a. When the child alone plays with the board, but the mother directs his lines.

b. When the child gives directions but the mother does, too (Mother allows him to direct, but will correct him or supercede his directions if

necessary). Here the mother is encouraging the child and allowing him some autonomy, but she retains the basic control.

4. Alternatives Under "Mother Structures"

a. Emphasis on drawing figures. For categories 1-3 below the mothers are concerned about drawing figures, and attempt to do so by guiding or directing the child. They are not satisfied with simply turning the button to make lines. "Practice" for these mothers means figure construction, not button turning. The mothers who are scored 4 and 5, on the other hand, are apparently satisfied with "turning the button" as the needed practice, since they typically do not guide the child's lines. Telling the child to reverse does not count as guiding if it is done only because the child has reached the edge of the board and does not know how to get the line to appear again.

(1). Mother Explains and/or Demonstrates the Board: Here the mother shows the child the relationship between the way the knob is turned (described as "toward you" or "this way", etc.), and the direction of the line on the board. Then the mother directs the child, "calling" these instructions. Another example which belongs here is when the mother does not give a complete or formal explanation but she predominantly directs the child by twirling her hand or by turning the child's button to start him. These are considered "demonstrations." If the mother turns the child's button herself (rather than let the child do it) or if she turns it only to get it away from the edge, this is NOT demonstration.

(2). Mother Use Called Directions: This includes cases where the child is already familiar with the board and cases where the mother directs him AS IF he were. *"Called Directions" means* that the mother DOES NOT explain or demonstrate the knob-line relationship, but nevertheless gives specific

directions ("Now you make the top", "Now go up"). The mother's directions are purely verbal. If the mother twirls her hand to direct or turns the child's button to get him started, she is demonstrating, not calling.

(3). Mother Tells Child to Start, Stop, and Reverse: Here the emphasis is less clearly on figure drawing and more on button turning than in the above. In guiding the child the mother does not tell the child which way to turn BEFORE he turns. She simply tells him to turn. Then, if he goes the wrong way, she tells him to reverse. The mother may or may not label the figures they draw. Usually she tells the child only at the end. The point is that the child is not told to make a specific LINE; he is instead told only to turn. The direction of turning is not specified until after he begins, and is only implied if he goes in the "correct" direction. Regardless of the number or complexity of figures drawn, the rating is 3 if the mother sticks to this trial and error approach.

b. Emphasis on Turning the Buttons.

(4). Mother and Child Take Non-specified Turns: Here the mother does not guide the direction of the child's lines, even after the fact. She insists only that the child refrain from turning while she turns. Otherwise, she is satisfied with the child's lines, regardless of their direction. The child, in effect, never learns that a line should go one way and not the other. If the mother should tell the child to reverse only to get him away from the edge of the board, but does not guide him otherwise, the rating is still 4 and not 3.

(5). Mother and Child Turn Simultaneously. Here the mother demands only that the child turn the button. She seems satisfied as long as the child makes lines, any lines, on the board. The following instructions to the

child do <u>not</u> change the rating of 5:

a) The mother tells the child to reverse because he has reached the edge of the board.

b) She tells him to stop because she wants to shake out the board.

c) They take turns briefly but apparently by chance (i.e., the mother doesn't demand it, and they then return to simultaneous turning).

5. <u>Single Score for Practice Period</u>

Since mothers often vary in their practice period behavior so that they fall into two or more of the categories, some method of assigning a single score must be used. Possible choices include the coding of subunits of the practice period and averaging, coding the typical or modal behavior, and coding the highest level of behavior to appear. For the subjects of the Cognitive Environment Study the last method seemed most appropriate. In samples where the average level of ability or education of the subjects is higher, an alternative method may be preferred. In the Cognitive Environment Study each case was coded for the highest level category (lowest number on the list below) which applied <u>at any time</u> during the practice period.

1. Mother <u>explains</u> and/or <u>demonstrates</u> how to use the board.
2. Mother uses <u>called</u> directions, <u>assuming</u> that the child knows which way to turn.
3. Mother tells child to <u>start</u> and <u>stop</u>, and to <u>reverse</u> if he goes the wrong way.
4. Mother and child <u>take non-specified turns</u>. Mother demands only that the child follow start-stop directions.

5. Mother and child typically turn simultaneously. Mother does not demand that they take turns.

*6. Child takes initiative in directing lines, mother follows. Mother does not attempt to teach child or to direct his lines.

*7. Child practices alone.

*8. Mother practices alone.

*9. No practice.

B. SPECIFICITY OF DIRECTIONS

For each line that the child makes, the mother's direction (if any) may be coded for presence or absence of specificity. "Specificity" here refers to whether the direction of the line to be made (up or down) or of the knob to be turned (clockwise or counterclockwise) is indicated by the mother before the child begins to turn his knob. Specificity is coded "present" if the mother makes any attempt to specify which direction the child is to turn.

Examples:

"Go up."
"Turn toward Mommy."
"Go the same way as last time."
"Turn like this." (demonstrating with hand motions)
"Come to this line." (or "my finger")

Specificity is coded as "absent" when the mother merely tells the child to turn without giving any indication of direction, or when she says nothing at all. Examples:

"Okay."
"Your turn."
"Now make your line." (without pointing or gesturing)

* Categories 6-9 were combined under the heading "Mother does not structure Practice Period."

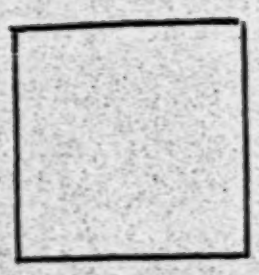
Specificity must occur before the child indicates which way he is going to turn his knob. Confirmatory feedback ("Okay, keep going.") and correction ("No, the other way.") do not count.

Since subjects vary in the number of lines made, scores for specificity in directions must be based on a constant subsample or expressed as percentages before subjects can be compared. Our scores are based on a subsample of 25 directions (the total number of lines made by the child on the first attempt at each design; or, if the first attempt was incomplete, the first N lines he made on attempts at the design, where N = the number of lines to be made by the child on that design). An alternative method would be to code every line made by the child, and to compute the percentage preceded by specific directions from the mother.

C. USE OF THE MODELS

The design models (on 3 3/4" x 5" cards) were placed on the table by the tester and left for the mothers to manipulate at will. Mothers vary considerably in the degree to which they show the models to the child during figure construction. On each design the mother was coded for whether or not she showed the model to the child. "Showing" the model included holding it up for the child to see, pointing to it, or specifically telling him to look at it. The mother did not have to use the model for giving directions to be credited with showing it to the child; holding it up and saying, "We're making this," was sufficient. The score used was the total number of design models shown to the child (0-5, of a total of 5 designs).

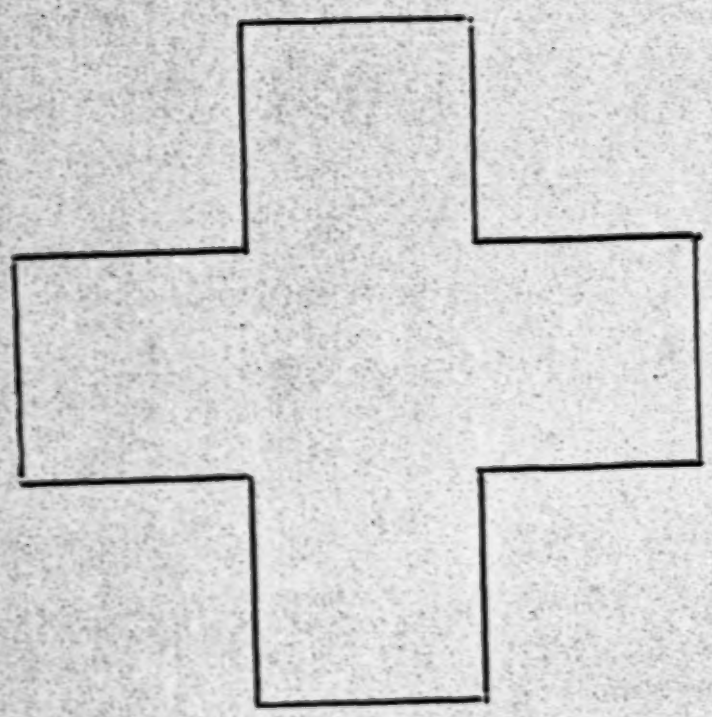
Design Models



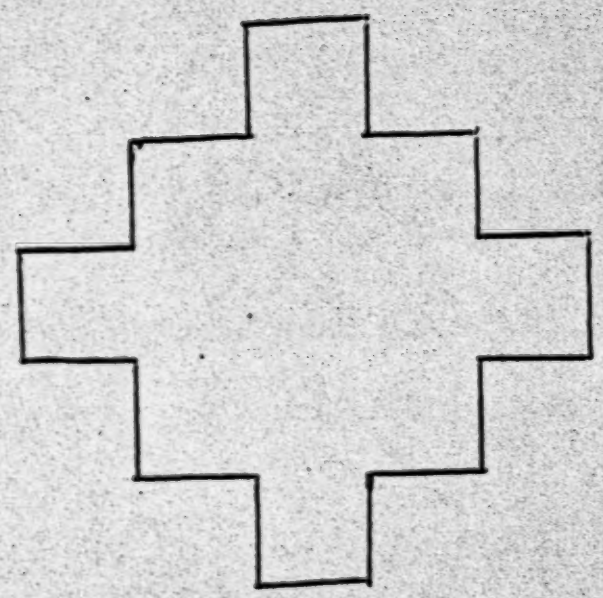
4.

6.

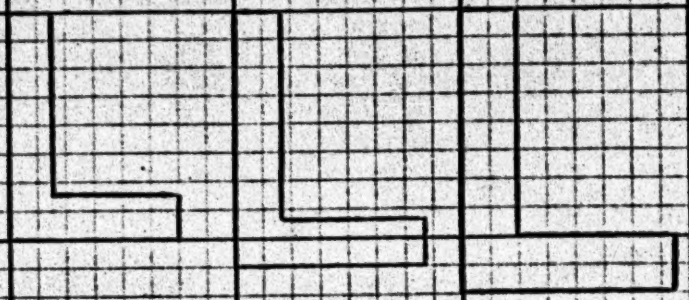
8.



12.



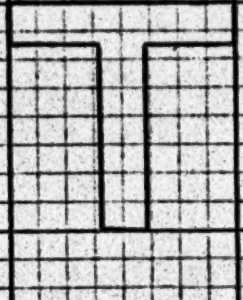
20.



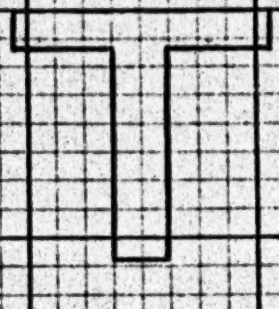
MODEL

-2

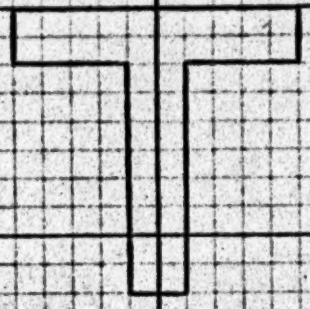
-4



MODEL



-2



-4